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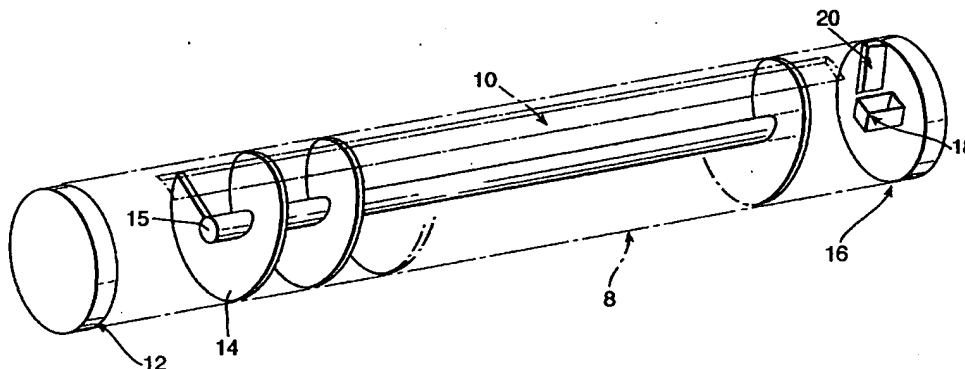
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ning of each regular issue of the PCT Gazette.

(54) Title: PEST CONTROL DEVICE



(57) Abstract: A flying insect trap is disclosed that is used in conjunction with a window with light coming through the window being used to attract the flying insects and/or in conjunction with an artificial source of light such as an array of LEDs with artificial light being used to attract the flying insects. The trap includes a receptacle (8) having a slot (10) through which insects can pass. The trap further comprises means for automatically removing said insects from the receptacle, for example an Archimedes' screw (14) located within the receptacle or a vacuum pump to which the receptacle can be connected.

WO 2005/048702 A1

Pest Control Device

The invention relates to a method and a device for trapping flying insects and similar small pests.

5

Fly traps that incorporate sticky trapping surfaces that are positioned on windows are well known in the art. Such devices use natural light coming through the window to attract flying insects and, if the insects contact the sticky paper, the insects are trapped.

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An early example of such a fly-catcher is that described in US 560,040. In US 560,040, a transparent glass plate that is covered in a sticky material is placed against a window. Flying insects become trapped in the sticky material if they contact it.

15

A problem with the device disclosed in US 560,040 is that a glass plate having insects trapped thereon is unsightly. This problem is addressed to a certain extent by US 5,022,179 and US 5,815,981.

20

In US 5,022,179, a sticky surface is positioned at right angles to a window and an additional panel, parallel to the window, obscures the sticky surface from view.

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In US 5,815,981, a V-shaped trough is located on a windowsill. The internal sections of the trough are covered in a sticky substance. As with the device of US 5,022,179, the sticky surface is obscured from view such that trapped insects cannot readily be seen.

30

There are a number of problems associates with known traps for flying insects that make use of natural light to attract the insects.

- 5 As described above, many of the traps are unsightly when a significant number of insects have been trapped. As discussed above, this problem has been at least partially addressed by some prior art devices.
- 10 Many devices which make use of natural light to attract flying insects rely on flying insects randomly coming into contact with the sticky surface of the trap rather than the ordinary window; such traps are inefficient. This problem is at least partly addressed in some of the prior art
- 15 devices by providing a further method of attracting the insects into the trap itself, such as impregnating the trapping adhesive with a scent that attracts insects.

- Many of the prior art devices use a simple sticky
- 20 substrate, perhaps shielded from view, that traps insects that contact it. Such a device suffers from at least two problems. First, the substrate must be regularly replaced. Second, the trapped insects represent a hygiene hazard before the substrate is replaced.

- 25 The device and method of the present invention seeks to overcome or mitigate at least some of the problems identified above.

- 30 The present invention provides a method of trapping flying insects comprising the steps of attracting said insects to a trap using a source of light, including the provision, in

the trap, of a receptacle having an opening through which insects can pass, the method further comprising automatically removing said insects from the receptacle.

- 5 The present invention also provides a method of trapping flying insects comprising the steps of placing a trap at or near the interior surface of a window and relying on ambient light passing from the exterior to the interior of the window to attract flying insects to the interior
- 10 surface of the window for trapping, including the provision, in the trap, of a receptacle having an opening through which insects can pass, the opening being so positioned in relation to the interior surface of the window as to permit an insect moving along the interior
- 15 surface of the window towards the receptacle to pass through the opening, the method further comprising automatically removing said insects from the receptacle.

- The present invention also provides a device for trapping
- 20 flying insects, the device comprising: a source of light for attracting flying insects to the device; a receptacle having an opening through which insects can pass; and means for automatically removing said insects from said receptacle.

- 25
- The present invention further provides a device for trapping flying insects, the device comprising a receptacle having an opening through which insects can pass and means for automatically removing said insects from said
- 30 receptacle, wherein, in use, said device is placed at or near the interior surface of a window and relies on ambient light passing from the exterior to the interior of the

window to attract said flying insects to the interior surface of the window for trapping and wherein said opening is so positioned in relation to the interior surface of the window as to permit an insect moving along the interior surface of the window towards the receptacle to pass
5 through the said opening.

The present invention makes use of either natural light coming in through a window, artificial light generated at
10 the trap or a combination of the two to attract flying insects to a trap. The present invention then enables the trapped insects to be stored in a hygienic manner that is out of sight and provides a mechanism for automatically removing the insects for the trap, thereby addressing at
15 least some of the problems identified above.

In one form of the invention, the opening in the receptacle is an elongated slot.

20 The step of automatically removing insects from the receptacle may comprise activating an Archimedes' screw located within said receptacle. The present invention may further comprise the removal of insects from the thread of said Archimedes' screw, for example by providing a
25 mechanical means, such as a blade or a brush, to remove the insects. The use of an Archimedes' screw is particularly advantageous when the pest control device of the present invention is used in conjunction with a window that is not straight, since an Archimedes' screw can be bent around
30 corners.

The step of automatically removing insects from the receptacle may alternatively comprise activating a vacuum pump and may include moving said receptacle to align said opening with an inlet of said vacuum pump. This movement
5 may be in the form of rotation of the receptacle. The vacuum pump may be replaced with a positive pressure device.

The step of automatically removing said insects from the
10 receptacle may be activated intermittently at predetermined intervals (e.g. once per week).

The present invention may further comprise the step of
collecting trapped insects for disposal.

15

In one form of the invention, the said source of light is natural light. In this form of the invention, the trap may be placed at or near the interior surface of a window and rely on ambient light passing from the exterior to the
20 interior of the window to attract flying insects to the interior surface of the window for trapping.

The trap may be placed near the base of the interior surface of the window for trapping insects moving towards
25 the base of the window. Alternatively or in addition, the trap may be positioned substantially at right angles to the window.

In one form of the invention, the window is curved and the
30 trap is shaped to conform to the curve of the window; in another form of the invention, the window is a bay window. Other shapes of window are within the scope of the

invention: the trap can be provided in a number of different shapes and/or the trap can be provided in sections in order to approximate to the shape of the window.

5

The present invention may further comprise the step of applying an insecticide to said window, for example using a pen or a pad.

- 10 The trap may include one or more elongated flaps positioned along the length of the trap to channel said insects towards said opening in said receptacle. Such flaps may be positioned on the exterior of the trap, within the interior of the trap, or both. If the trap is used in conjunction
15 with a window, the, or one of, the elongated flaps may be pushed against the window to prevent flying insects from falling between the pest control device and the window.

- An artificial light source may be used as an additional
20 means for attracting insects to said trap. That light source might be activated either when the natural lighting is below a predetermined level or at predetermined times. For example, the light source may be activated at dawn and dusk. A control means may be provided to control the
25 activation of the source of artificial light. The source of artificial light may be one or more light emitting diodes, e.g. low-power ultraviolet light emitting diodes.

- In another form of the invention, the primary source of
30 light is a source of artificial light. Natural light may be a secondary source of light: alternatively, natural light may not be used as a source of light at all.

A means for inhibiting the ability of a flying insect to exit the receptacle through the opening in the receptacle may be provided. This may take the form of a curved
5 channel or an S-shaped channel, although other forms are possible. The provision of such a means is particularly useful in applications where the flying insects are not dead when they enter the receptacle. For example, some forms of the invention rely on the flying insects becoming
10 exhausted by repeatedly being attracted to the light source and then falling into the receptacle. By placing an obstruction to make it difficult for such insects to exit the receptacle, it is more likely that the insects will be retained within the trap.

15 Several pest control devices and methods in accordance with the invention will now be described, by way of example only, with reference to the accompanying schematic drawings in which:

20 Fig. 1 shows a pest control device in accordance with a first embodiment the present invention, the device being positioned against a window;

25 Fig. 2 shows the pest control device of Figure 1 in isolation;

Fig. 3 is a cross-section of the pest control device of Figures 1 and 2, taken along the line 3-3 of Figure 2;

Fig. 4 shows a receptacle for use with the pest control device of Figures 1 to 3;

30 Fig. 5 is an exploded, partially cut-away view of a receptacle in accordance with one aspect of the present invention;

Fig. 6 shows a receptacle in accordance with another aspect of the present invention;

Fig. 7 is a cross-section of the pest control device of Figures 1 to 3, taken along the lines 7-7 of Figure 2, in accordance with an aspect of the present invention;

Fig. 8 is a cross-section of the pest control device of Figures 1 to 3, taken along the lines 7-7 of Figure 2, in accordance with another aspect of the present invention;

Fig. 9 shows a variant of the pest control device shown in Figures 1 to 4;

Fig. 10 is a partially cut-away, side elevation of the pest control device of Figure 9; and

Fig. 11 shows a variant of the pest control device of Figures 9 and 10;

Fig. 12 is a cross-section of a receptacle in accordance with an aspect of the present invention;

Fig. 13 is an exploded view of a pest control device in accordance with an aspect of the present invention.

Figures 1 to 3 show a pest control device 2, in accordance with the present invention. Figure 1 shows the pest control device 2 in a normal operational position against the internal surface of a window 4. Light coming in through the window 4 is used to attract insects towards the window.

An insecticide is provided on the internal surface of the window 4 to stun or kill any insect that comes into contact with the window. The stunned or killed insect then falls into the pest control device 2.

A number of methods of applying such an insecticide to a window are known. These include using a pen and using a pad. The use of a pad to apply insecticide to a window is particularly convenient, especially when regular cleaning
5 of the window means that the insecticide must be reapplied regularly.

The pest control device 2 includes a louvered panel, indicated generally by the reference numeral 6, the
10 louvered panel 6 having a number of slots 6a, 6b ... 6n. An insect that has been stunned or killed after coming into contact with the insecticide on the window 4 drops towards the device 2 and falls through one of the slots 6a, 6b ... 6n into the interior of the pest control means 2.

15 Figure 3 is a cross-sectional view of the pest control means 2 taken along the line 3-3 of Figure 2. In the interior of the pest control means 2, a receptacle 8 is provided for the collection of insects that fall through
20 the slots 6a, 6b ... 6n. The receptacle 8 is shown separately in Figure 4. The receptacle 8 includes an opening or slot 10 extending along the length of the receptacle. In use, the slot 10 is positioned so that insects that fall through the louvered panel 6 of the pest
25 control means 2 also fall through the slot 10.

The pest control device of the present invention also provides a means for automatically removing the insects from the interior of the receptacle 8. This can be
30 achieved in a number of ways. Two examples are described below: the use of an Archimedes' screw and the use of a vacuum pump.

Figure 5 is an exploded, partially cut-away view of the receptacle 8 in accordance with a first aspect of the invention. As described above, the receptacle 8 includes a slot 10 extending along the length of the receptacle. A motor 12, for example an electric motor, is located at a first end of the receptacle 8 and a collection mechanism, indicated generally by the reference numeral 16, is located at the other end of the receptacle 8. An Archimedes' screw 14 is contained within the interior of the receptacle and extends from the motor 12 to the collection means 16. In use, the motor 12 rotates a shaft 15 of the Archimedes' screw.

As described above, the slot 10 is positioned so that, in the use of the pest control device 2, insects that fall through the louvered panel 6 also fall through the slot 10, thereby entering the interior of the receptacle 8. Accordingly, insects that fall into the pest control device 2 are retained by the thread of the Archimedes' screw 14.

When the Archimedes' screw 14 is rotated by the motor 12, any insects retained by the thread of the Archimedes' screw 14 are moved towards the collection mechanism 16. The pest control means 2 may be provided with a control means (not shown) to activate the motor at predetermined intervals, for example once per week (of course, other frequencies could be used).

A mechanical means is provided at the second end of the receptacle 8 as part of the collection mechanism for removing any insects retained in the thread of the

Archimedes' screw. A collecting means 18, such as a cup, is provided for collecting insects removed by the mechanical means. The mechanical means may take one of many forms. In the example of Figure 5, a blade 20 is
5 located at the end of the Archimedes' screw 16 in order to remove insects from the screw thread. Other suitable means may be used, for example, the blade 20 may be replaced with a brush. The mechanical means, such as a blade or a brush, may be spring loaded to ensure that it remains in contact
10 with the end of the Archimedes' screw.

In one form of the invention, the receptacle 8 is a cylindrical tube made of a plastics material, having a diameter of the order of 15 to 20 millimetres and the slot
15 10 has a width of the order of 10 millimetres.

An alternative mechanism for removing the insects from the pest control device is described below with reference to Figure 6. In Figure 6, the receptacle 8 of Figure 4 is
20 replaced with a receptacle 8'. The receptacle 8' is provided with a slot 10' similar to the slot 10 of the receptacle 8 described above. The receptacle 8' includes an end cap 22 that includes means, such as a motor, for rotating the receptacle 8'. By way of example, the motor
25 may rotate a shaft that extends through the interior of the receptacle 8'

In the use of the receptacle 8' in the pest control device 2 described above, the slot 10' is positioned so that
30 insects that fall through the louvered panel 6 of the trap fall through the slot 10' into the interior of the receptacle 8'. Accordingly, insects that fall into the

trap 2 are retained within the hollow interior of the receptacle 8'.

Periodically, perhaps once per week, the receptacle 8' is
5 rotated by 90 degrees by the motor contained within the end
cap 22 so that the slot 10' is aligned with an inlet 24 of
a vacuum pump. The vacuum pump inlet 24 is connected to a
vacuum pump 26 via a connector 28. An outlet pipe 30 is
provided for the vacuum pump 26. With the slot 10' aligned
10 with the inlet 24, the vacuum pump is activated in order to
remove any insects contained within the interior of the
receptacle 8'. The outlet pipe 30 may be coupled to a
collection device, such as a cup.

15 In one form of the invention, the receptacle 8' is a
cylindrical tube made of a plastics material, having a
diameter of the order of 15 to 20 millimetres and the slot
10' has a width of the order of 10 millimetres.

20 A number of variants of the mechanism of Figure 6 are
possible. For example, the vacuum system could be replaced
by a positive pressure system. The receptacle 8' might be
rotated by an angle other than 90 degrees to align with the
vacuum system (or a positive pressure system). Further, an
25 alternative movement might be provided, such as moving the
receptacle to one side in order to align the slot 10' with
a vacuum or positive pressure system.

Figures 7 and 8 show two exemplary cross-sectional views of
30 the pest control means 2 of Figure 2, taken along the lines
7-7 of Figure 2. Shown in Figures 7 and 8 are the louvered
panel 6 and the receptacle 8 having an opening or slot 10.

As shown in Figure 7, the receptacle 8 and slot 10 are sized and positioned so that any insect falling through the louvered panel 6 falls into the interior of the receptacle 8. The system of Figure 8 differs from that of Figure 7 in that the receptacle is much smaller, thereby leading to the possibility of insects falling through the panel 6, but not falling through the slot 10. The system of Figure 8 overcomes this problem by providing elongated flaps 32 and 33 that extend from the louvered panel 6 to the slot 10 of the receptacle 8. Flaps 32 and 33 channel insects falling through the panel 6 to the slot 10 of the receptacle 8.

Clearly, flaps such as elongated flaps 32 and 33 can be used in conjunction with the receptacle 8' for the same purpose.

Figures 9 and 10 show a pest control device, indicated generally by the reference numeral 40. The pest control device 40 is a variant of the pest control device 2 described above and includes a main body 46 having an opening or slot 48 positioned above a receptacle 50. The receptacle 8 or the receptacle 8' may be used as the receptacle 50.

The pest control device 40 also comprises two elongated flaps 42 and 44 positioned above the slot 48. Flaps 42 and 44 are used to channel insects that fall towards the device 40 towards the slot 48; this effectively extends the area over which the device 40 operates without extending the area of the slot 48 or the size of the receptacle 50. Further, one of flaps 42 and 44 can be pushed firmly against the window with which the device 40 is being used

to ensure that no insects fall between the device 40 and the window. In an alternative form of the invention, only one elongated flap, such as flap 42, is provided. That flap may be pushed against the window with which the device
5 40 is being used to ensure that no insects fall between the device 40 and the window.

The pest control device 40 is used in a similar manner to the pest control device 2. Both pest control devices 2 and
10 40 are positioned against a window, with light coming through the window being used to attract insects towards the window.

Both pest control devices 2 and 40 make use of an
15 insecticide provided on the window to stun or kill any insect that comes into contact with the window, as described above. In the case of the pest control device 40, the stunned or killed insects are guided by the flaps 42 and 44 to the slot 48 and hence to the receptacle 50.
20 Of course, the slot 48 of the pest control device 40 could be replaced with a louvered panel such as the louvered panel 6 of the pest control device 2.

Clearly, flaps such as the flaps 32 and 33 described with
25 reference to Figure 8 can, if necessary, be provided within the interior of the pest control device 40, in order to channel insects towards the receptacle 50. Alternatively, the flaps 42 and 44 can be extended so that they continue within the interior of the pest control device 40 and
30 terminate at or near the slot 48 of the receptacle 50.

In addition to using natural light coming through the window 4 as a primary means for attracting insects towards each of the pest control devices described herein, the pest control device may also be provided with additional
5 lighting that acts as an additional attractant.

Ultraviolet lighting has been found to be particularly effective to attract insects, but other lighting may also be used. Such additional lighting may be provided when the natural lighting is low, for example at dawn and dusk,
10 thereby extending the time over which the trap is effective. Such additional lighting may be provided at times when a particular insect is known to be active.

By way of example, Figure 11 shows a pest control device
15 40', including flaps 42' and 44', a main body 46', a slot 48' and a receptacle (not shown). The pest control device 40' is identical to the pest control device 40 described above with reference to Figures 9 and 10, with the exception that an array of ultraviolet light emitting
20 diodes (UV LEDs) 52' is positioned on the interior surface of the flap 42'. When activated, the UV LEDs attract insects towards the device 40'. UV LEDs offer a cheap, low-power source of ultraviolet lighting. Other lighting systems, such as plasma lighting, could also be used.

25 Of course, positioning the UV LEDs on the flap 42' is only one of many possibilities. Lighting could be located on the window, in order to attract insects to the window (rather than to the pest control device). Lighting could
30 be located within the interior of the pest control device. Similar lighting schemes could also, of course, be used in conjunction with the pest control device 2 described above.

In one form of the invention, the additional lighting is activated under the control of a control device. The control device may activate the lighting at predetermined times, or on detecting predetermined light levels. Alternatively, or in addition, the lighting may be manually operable.

The pest control device of Figure 11 may be used without requiring the use of natural light coming through a window as a primary means for attracting insects towards each of the pest control devices described herein. In such an arrangement, the additional lighting of the trap of Figure 11 is the primary means attracting insects towards each of the pest control devices described herein. Thus, light from the artificial light sources shown in Figure 11 may be used as the primary source of light to attract flying insects to the trap. At the trap, the flying insects are able to drop into the receptacle of the trap.

20

It is noted that flying insects attracted to the trap of the present invention, regardless of whether they are attracted by natural light coming in through a window, by artificial light generated at the trap, or by a combination of both, will be repeatedly attracted to the light source. It has been found that such flying insects often fall into the receptacle of the trapping device as a result of exhaustion. Thus, it is not necessary to stun or kill the flying insects in order to retain the insects in the receptacle of the trap.

30

In one particular form of the invention in which artificial light is the primary means of attracting flying insects to the trap, the trap is placed on a wall. By way of example, the trap may be positioned to resemble the appearance of a traditional picture rail.

As noted above, the trap of the present invention does not need to be straight. Accordingly, the trap can be placed against a wall that is not straight.

10

The cross-sectional views of Figures 7 and 8 are cross-sectional views of the pest control device 2 that show how flying insects are channelled towards the receptacle 8. Figure 12 shows a cross-sectional view of a pest control device 60 that is a variant of the device 2. The pest control device 60 includes flaps 62 and 63 that are similar to flaps 32 and 33 shown in Figure 8, but include additional end pieces that restrict the ability of a flying insect to get out of receptacle 64 once it has fallen into the receptacle. This feature is useful if insects are likely to fall into the receptacle whilst still alive.

20

Figure 13 is an exploded view of the pest control device 60. The pest control device 60 includes an Archimedes' screw of the form described above. As can be most clearly seen in Figure 13, the extensions to flaps 62 and 63 form an S-shaped channel which is effective to channel the insects into the receptacle 64 but makes it difficult for insects to get out of the receptacle.

25

30

The extended flaps 62 and 63 are an exemplary means for inhibiting the ability of a flying insect that has fallen

into the receptacle of the pest control device to exit that receptacle. Many other forms are possible. The key feature here is that it is made difficult for flying insects, especially physically exhausted flying insects, to
5 get out of the receptacle. Of course, extended flaps such as flaps 62 and 63 could be used in the pest control devices 2, 40 and 40' described above.

The pest control devices 2, 40, 40' and 60 may include
10 means for applying pheromones, or other substances that attract insects to the substrate or means for emitting such substances into the atmosphere immediately surrounding the pest control device. The said means may comprise one or more pheromone sources, each of which is arranged to emit a
15 plume of pheromones into the atmosphere immediately surrounding the pest control device, and for that purpose the sources may be provided with porous filters, or the sources may be in the form of phials, each of which is designed to release a plume of a continuous stream of
20 molecules. Thus, it is possible to select a pheromone or a combination of different pheromones depending on the insects that it is intended be trapped by the device. For example, in a cigarette factory, a cigarette beetle pheromone would be appropriate. An analysis of the insects
25 trapped can be made to enable the appropriate pheromones to be selected.

The control means in the pest control devices 2, 40, 40' or 60 may be provided with an override, which causes the
30 control means to activate the device to advance the Archimedes' screw 14, or activate the vacuum pump 26. The override might be used by a maintenance engineer to remove

all insects from the pest control device. This override might be used by an operator, for example if a large number of insects have been trapped.

5 The collecting means described above may be formed as a unit, which is removable from the remainder of the receptacle with which the collecting means is associated. When it is necessary or desirable to replace the collecting means, the unit can be removed from the remainder of the
10 receptacle, which can be left *in situ*. The collecting means may then be emptied, for example by a maintenance engineer, and then replaced.

Although two mechanisms have been described for removing
15 insects from the receptacle, others are possible. For example, a conveyor belt might be provided onto which the insects fall.

The pest control devices 2, 40, 40' or 60 may be powered
20 using batteries. Alternatively, or in addition, the pest control devices may be solar powered.

A number of forms of the present invention are described herein. Several of those forms have a number of variants.
25 The skilled person will be aware that any of the variants may be applied to any of the forms of the invention. Accordingly, the present invention is not limited to the specific forms of the invention described herein.

CLAIMS:

1. A method of trapping flying insects comprising the steps of attracting said insects to a trap using a source
5 of light, including the provision, in the trap, of a receptacle having an opening through which insects can pass, the method further comprising automatically removing said insects from the receptacle.
- 10 2. A method as claimed in claim 1, wherein said source of light is natural light.
3. A method as claimed in claim 2, further comprising the steps of placing the trap at or near the interior surface
15 of a window and relying on ambient light passing from the exterior to the interior of the window to attract flying insects to the interior surface of the window for trapping, wherein said opening is so positioned in relation to the interior surface of the window as to permit an insect
20 moving along the interior surface of the window towards the receptacle to pass through the opening.
4. A method as claimed in claim 3, wherein the trap is placed near the base of the interior surface of the window
25 for trapping insects moving towards the base of the window.
5. A method as claimed in claim 3 or claim 4, wherein the trap is positioned substantially at right angles to the window.
- 30 6. A method as claimed in any one of claims 3 to 5, further comprising the step of applying an insecticide to

said window.

7. A method as claimed in any preceding claim, further comprising the use of an artificial light source as an
5 additional means for attracting insects to said trap.

8. A method as claimed in claim 7, wherein said light source is activated when the natural lighting is below a predetermined level.

10

9. A method as claimed in claim 7 or claim 8, wherein said light source is activated at predetermined times.

10. A method as claimed in claim 1, wherein said source of
15 light is a source of artificial light.

11. A method as claimed in claim 10, wherein said source of artificial light is the primary means of attracting insects to said trap.

20

12. A method as claimed in claim 10 or claim 11, further comprising the steps of placing the trap at or near the interior surface of a window and making use of ambient light passing from the exterior to the interior of the
25 window to attract flying insects to the interior surface of the window for trapping, wherein the opening in said receptacle through which insects can pass is so positioned in relation to the interior surface of the window as to permit an insect moving along the interior surface of the
30 window towards the receptacle to pass through the opening.

13. A method as claimed in claim 10 or claim 11, wherein said step of attracting said insects to the trap using a source of light does not make use of natural light.

5 14. A method as claimed in any one of claims 10 to 13, further comprising the step of applying an insecticide to said trap.

10 15. A method as claimed in any preceding claim, wherein said step of automatically removing insects from the receptacle comprises activating an Archimedes' screw located within said receptacle.

15 16. A method as claimed in claim 15, further comprising the step of removing insects from the thread of said Archimedes' screw.

20 17. A method as claimed in any one of claims 1 to 14, wherein said step of automatically removing insects from the receptacle comprises activating a vacuum pump.

25 18. A method as claimed in claim 17, wherein said step of automatically removing insects from the receptacle includes moving said receptacle to align said opening with an inlet of said vacuum pump.

30 19. A method as claimed in any preceding claim, wherein said step of automatically removing said insects from the receptacle is activated intermittently at predetermined intervals.

20. A method as claimed in any preceding claim, wherein

the trap includes one or more elongated flaps positioned along the length of the trap to channel said insects towards said opening in said receptacle.

5 21. A method as claimed in any preceding claim, further comprising the step of collecting trapped insects for disposal.

10 22. A method as claimed in any preceding claim, including the provision, in the trap, of a means for inhibiting the ability of a flying insect to exit the receptacle through the opening in said receptacle.

15 23. A method as claimed in claim 22, wherein said means for inhibiting the ability of a flying insect to exit the receptacle comprises a curved channel.

20 24. A method as claimed in claim 22, wherein said means for inhibiting the ability of a flying insect to exit the receptacle comprises an S-shaped channel.

25 25. A device for trapping flying insects, the device comprising:

a source of light for attracting flying insects to the device;

a receptacle having an opening through which insects can pass; and

means for automatically removing said insects from said receptacle.

30

26. A device as claimed in claim 25, wherein said source of light is natural light.

27. A device as claimed in claim 26, wherein, in use, said device is placed at or near the interior surface of a window and said source of light is ambient light passing
5 from the exterior to the interior of the window, wherein said ambient light is used to attract said flying insects to the interior surface of the window for trapping and wherein said opening is so positioned in relation to the interior surface of the window as to permit an insect
10 moving along the interior surface of the window towards the receptacle to pass through the said opening.

28. A device as claimed in claim 27, wherein, in use, the device is placed near the base of the interior surface of
15 the window for trapping insects moving towards the base of the window.

29. A device as claimed in claim 27 or claim 28, wherein, in use, the device is positioned substantially at right
20 angles to the window.

30. A device as claimed in any one of claims 25 to 29, further comprising a source of artificial light for use as an additional means for attracting insects to said trap.
25

31. A device as claimed in claim 30, further comprising control means for controlling the activation of said source of artificial light.

30 32. A device as claimed in claim 30 or claim 31, wherein said source of artificial light is a light emitting diode.

33. A device as claimed in claim 25, wherein said source of light is a source of artificial light.

34. A device as claimed in claim 33, wherein said source
5 of artificial light is the primary means of attracting insects to said device.

35. A device as claimed in claim 33 or claim 34, wherein,
in use, said device is placed at or near the interior
10 surface of a window and said source of light includes ambient light passing from the exterior to the interior of the window, wherein said ambient light is used to attract said flying insects to the interior surface of the window for trapping and wherein said opening is so positioned in
15 relation to the interior surface of the window as to permit an insect moving along the interior surface of the window towards the receptacle to pass through the said opening.

36. A device as claimed in claim 33 or claim 34, wherein
20 natural light is not used as a source of light for attracting said insects to the device.

37. A device as claimed in any one of claims 33 to 37,
further comprising control means for controlling the
25 activation of said source of artificial light.

38. A device as claimed in any one of claims 33 to 36,
wherein said source of artificial light is a light emitting
diode.

30

39. A device as claimed in any one of claims 25 to 38,
wherein said means for automatically removing insects from

the receptacle comprises an Archimedes' screw.

40. A device as claimed in claim 39, further comprising mechanical means for removing insects from the thread of
5 said Archimedes' screw.

41. A device as claimed in any one of claims 25 to 38, wherein said means for automatically removing insects from the receptacle comprises a vacuum pump.

10

42. A device as claimed in claim 41, wherein said receptacle is moveable so that, on activation of said vacuum pump, said opening is aligned with an inlet of said pump.

15

43. A device as claimed in any one of claims 25 to 42, further comprising control means arranged to activate said means for automatically removing said insects from said receptacle intermittently at predetermined intervals.

20

44. A device as claimed in any one of claims 25 to 43, further comprising one or more elongated flaps positioned along the length of the trap to channel said insects towards said opening in said receptacle.

25

45. A device as claimed in any one of claims 25 to 44, further comprising means for collecting the trapped insects.

30

46. A device as claimed in any one of claims 25 to 45, further comprising a means for inhibiting the ability of a flying insect to exit the receptacle through the said

opening in said receptacle.

47. A device as claimed in claim 46, wherein said means
for inhibiting the ability of a flying insect to exit the
5 receptacle comprises a curved channel.

48. A device as claimed in claim 46, wherein said means
for inhibiting the ability of a flying insect to exit the
receptacle comprises an S-shaped channel.

10

49. A kit comprising a device as claimed in any one of
claims 25 to 48 and further comprising an insecticide
dispenser.

15 50. A method substantially as hereinbefore described with
reference to, and as shown in, the accompanying drawings.

51. A device substantially as hereinbefore described with
reference to, and as shown in, the accompanying drawings.

1/8

Fig.1.

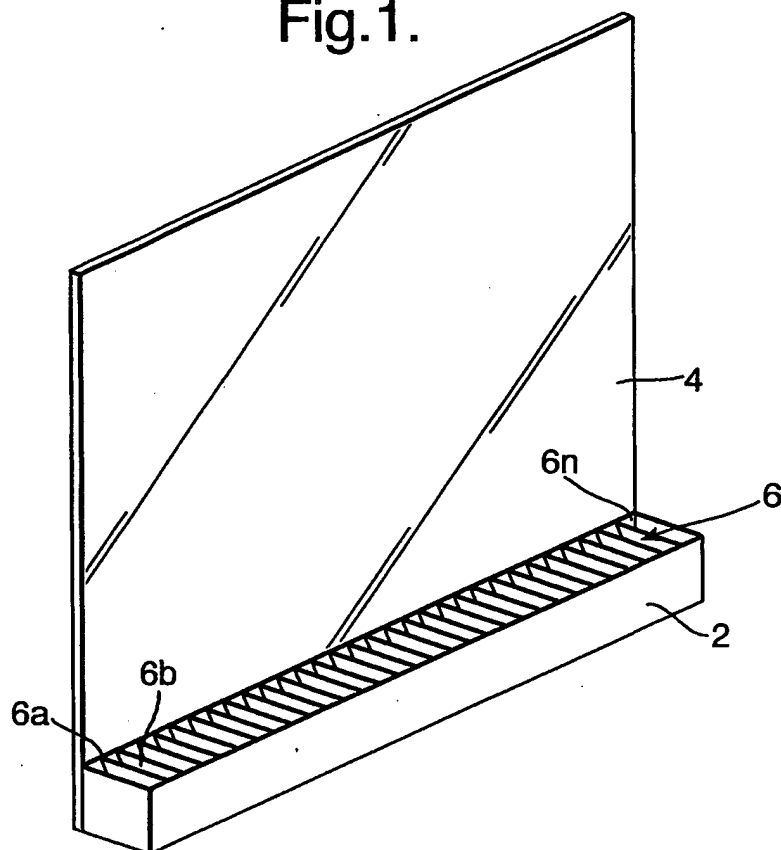
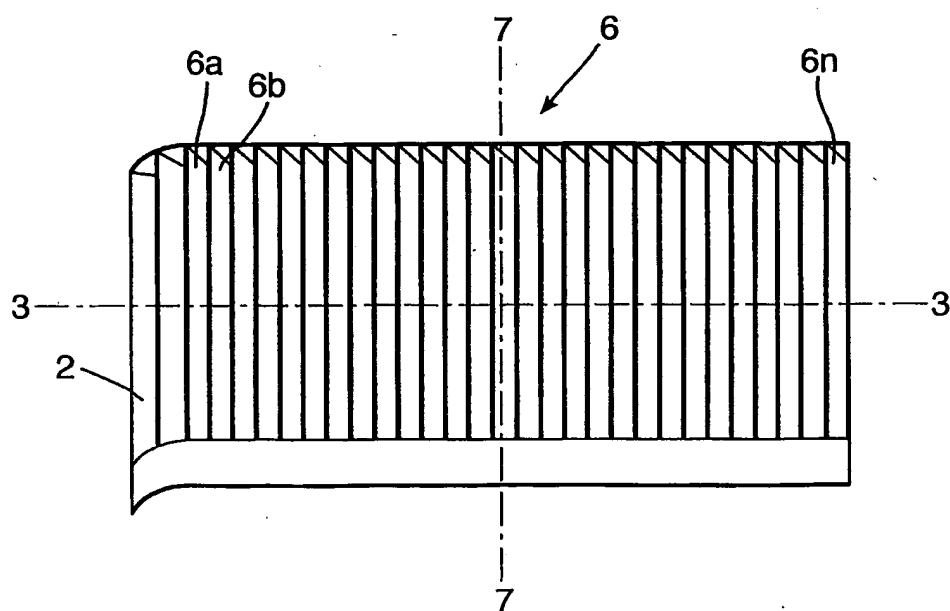


Fig.2.



2/8

Fig.3.

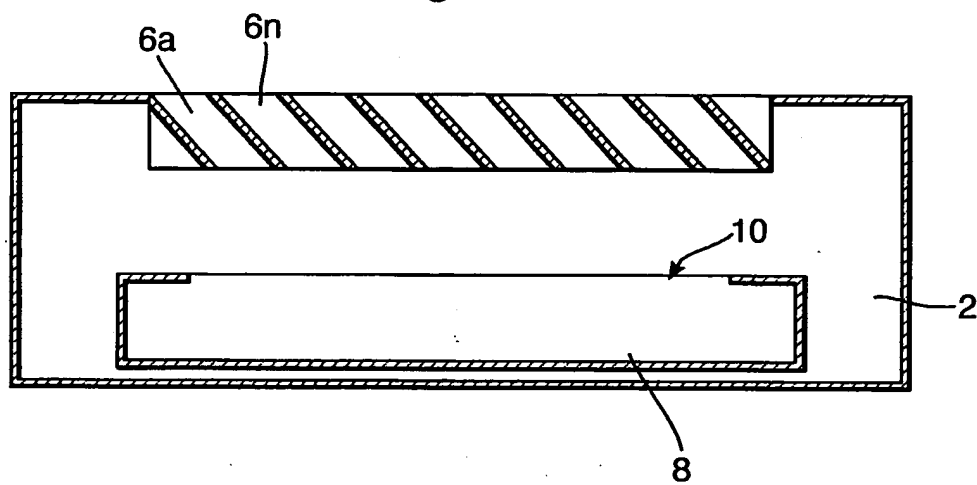
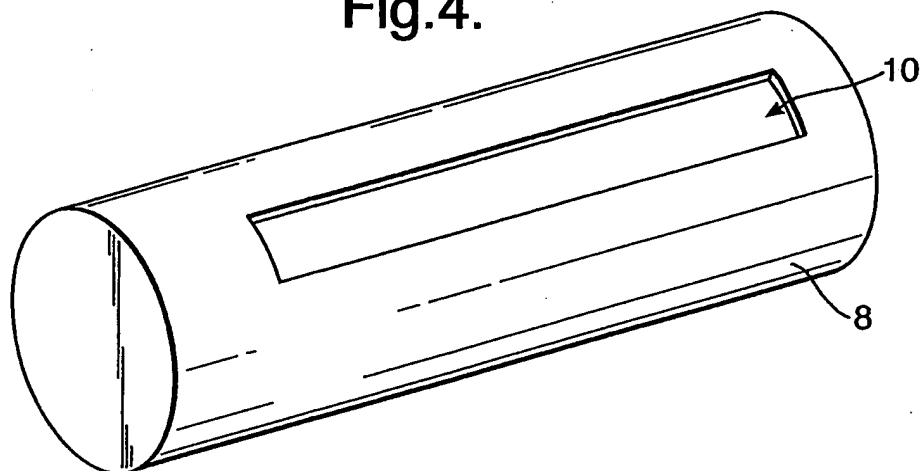
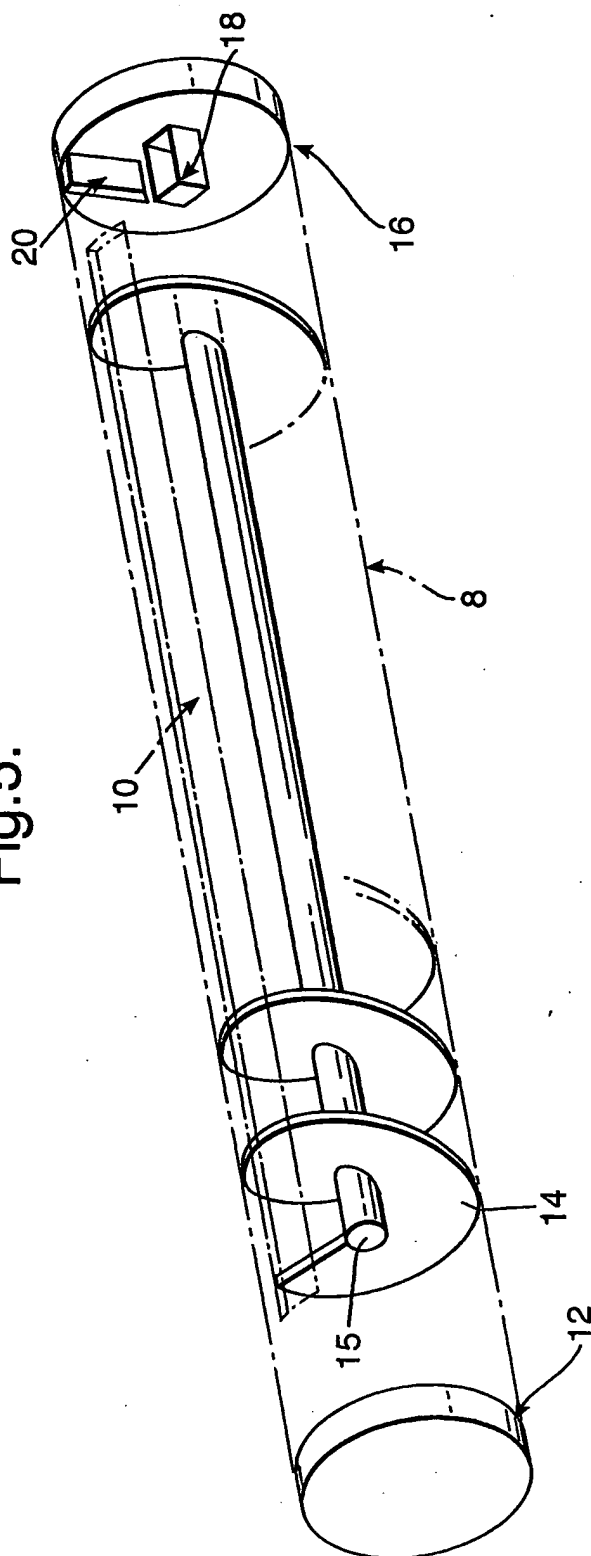


Fig.4.



3/8

Fig.5.



4/8

Fig.6.

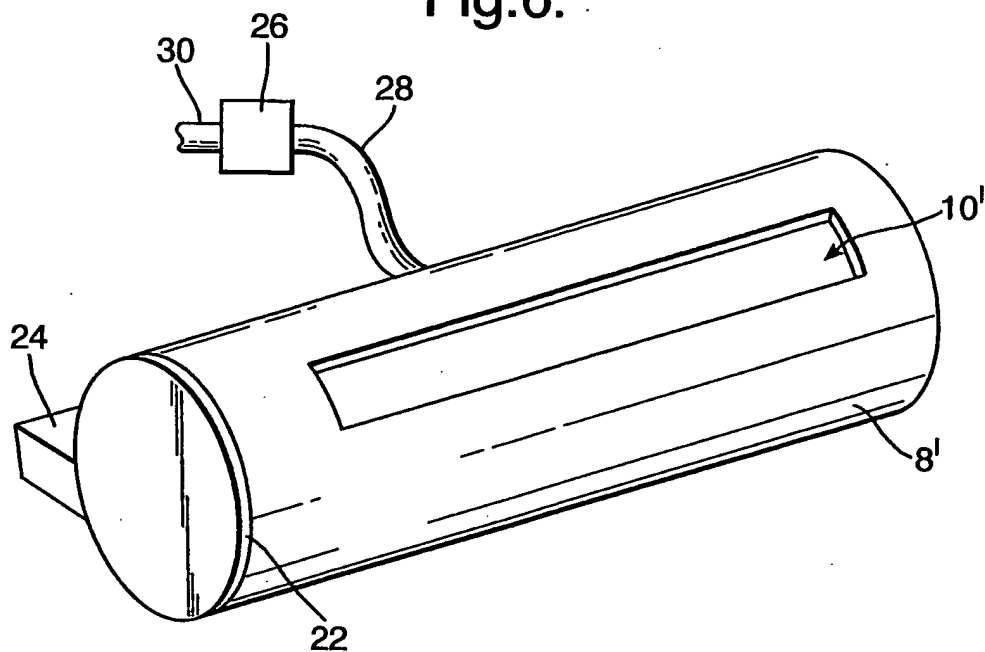
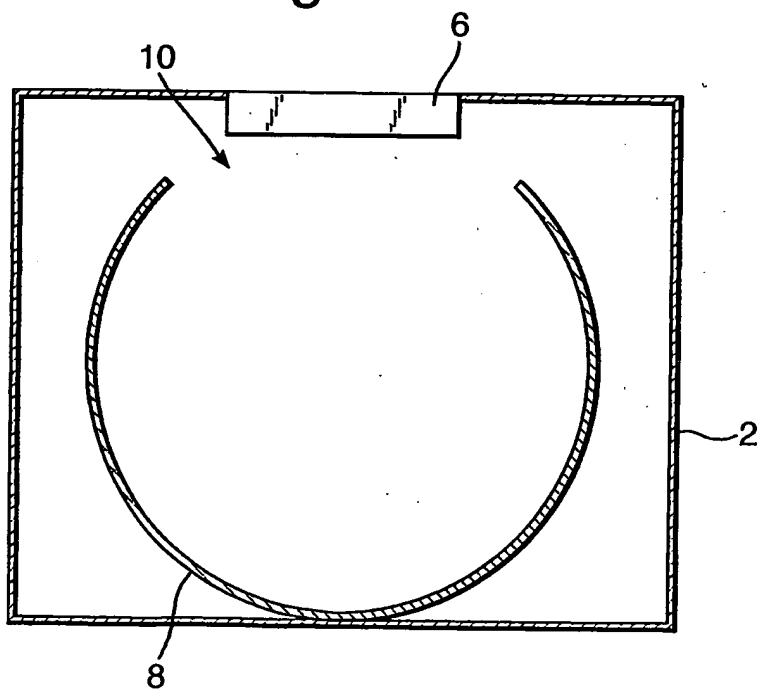


Fig.7.



5/8

Fig.8.

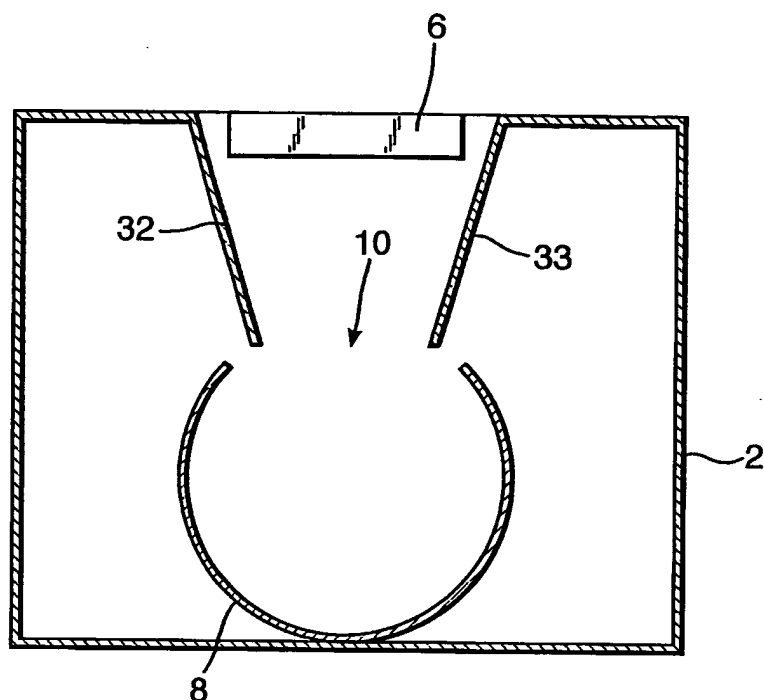
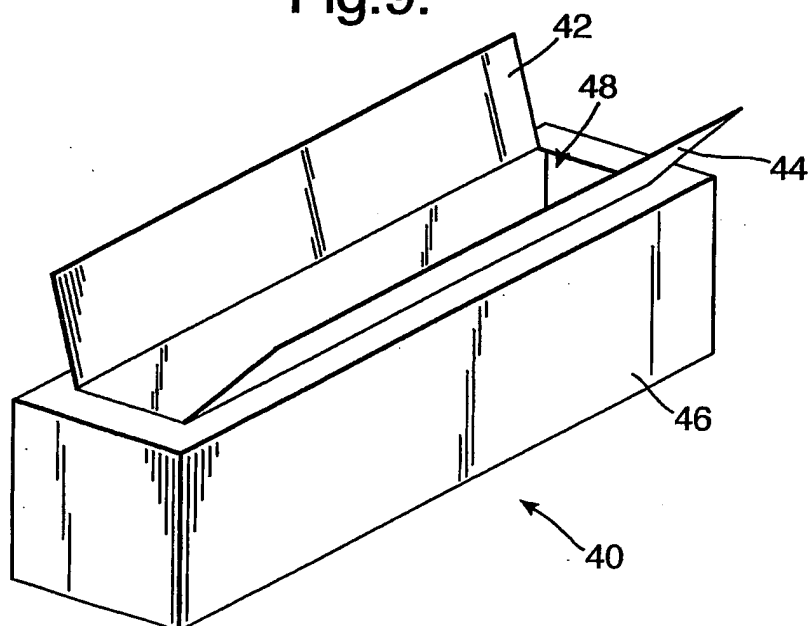


Fig.9.



6/8

Fig.10.

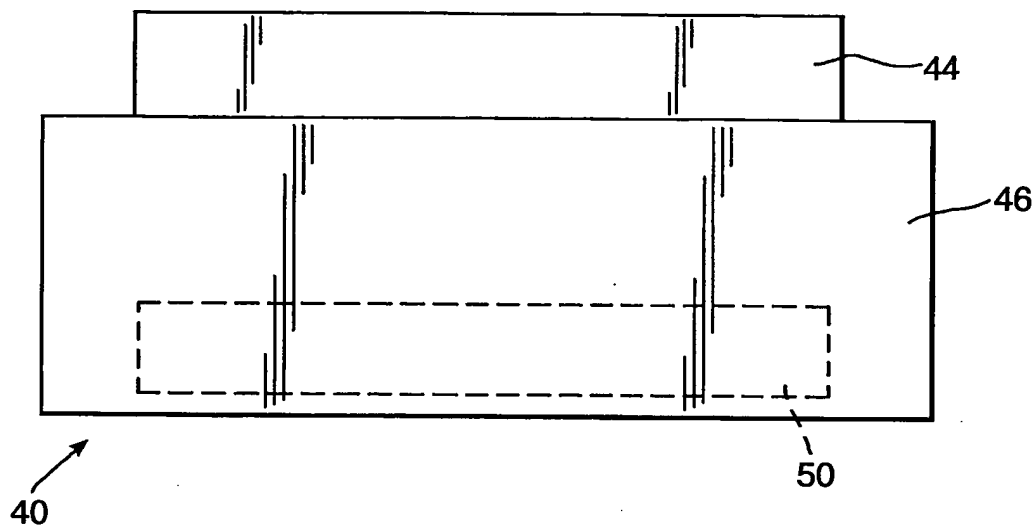
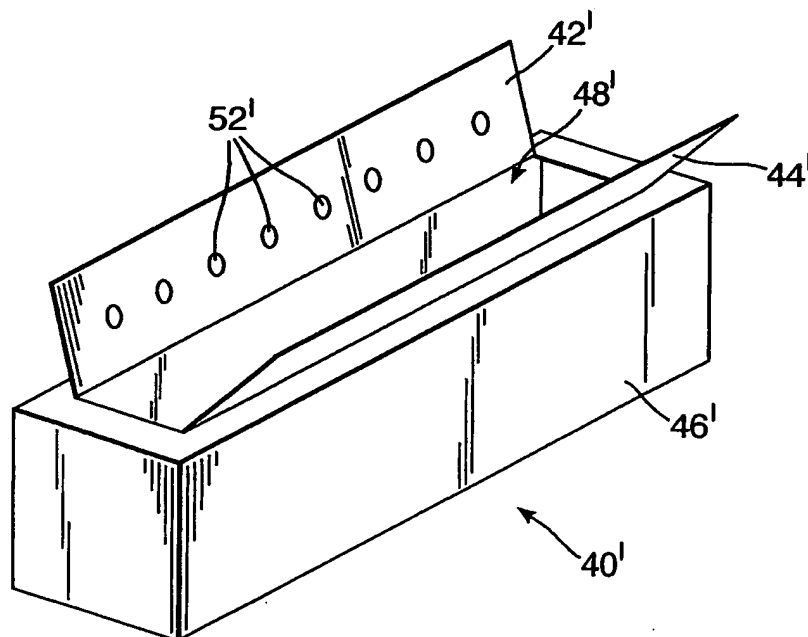
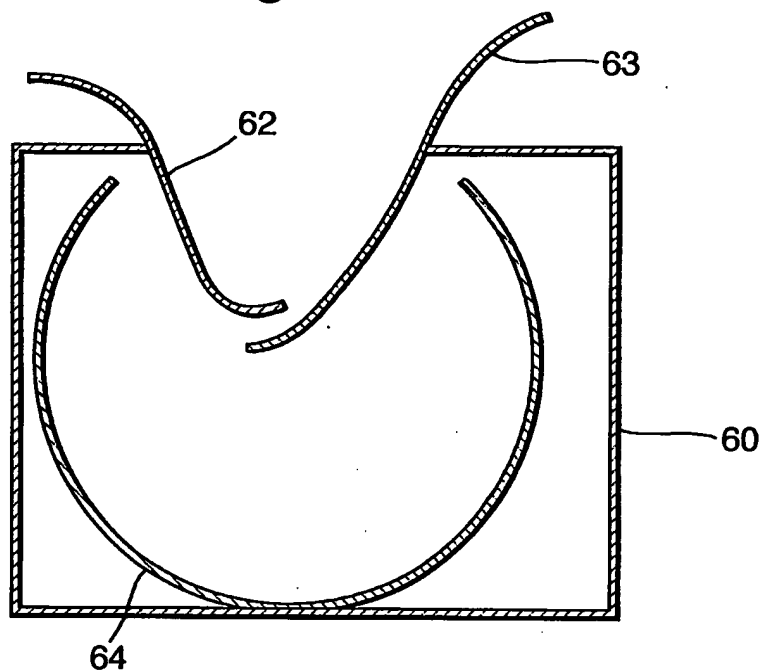


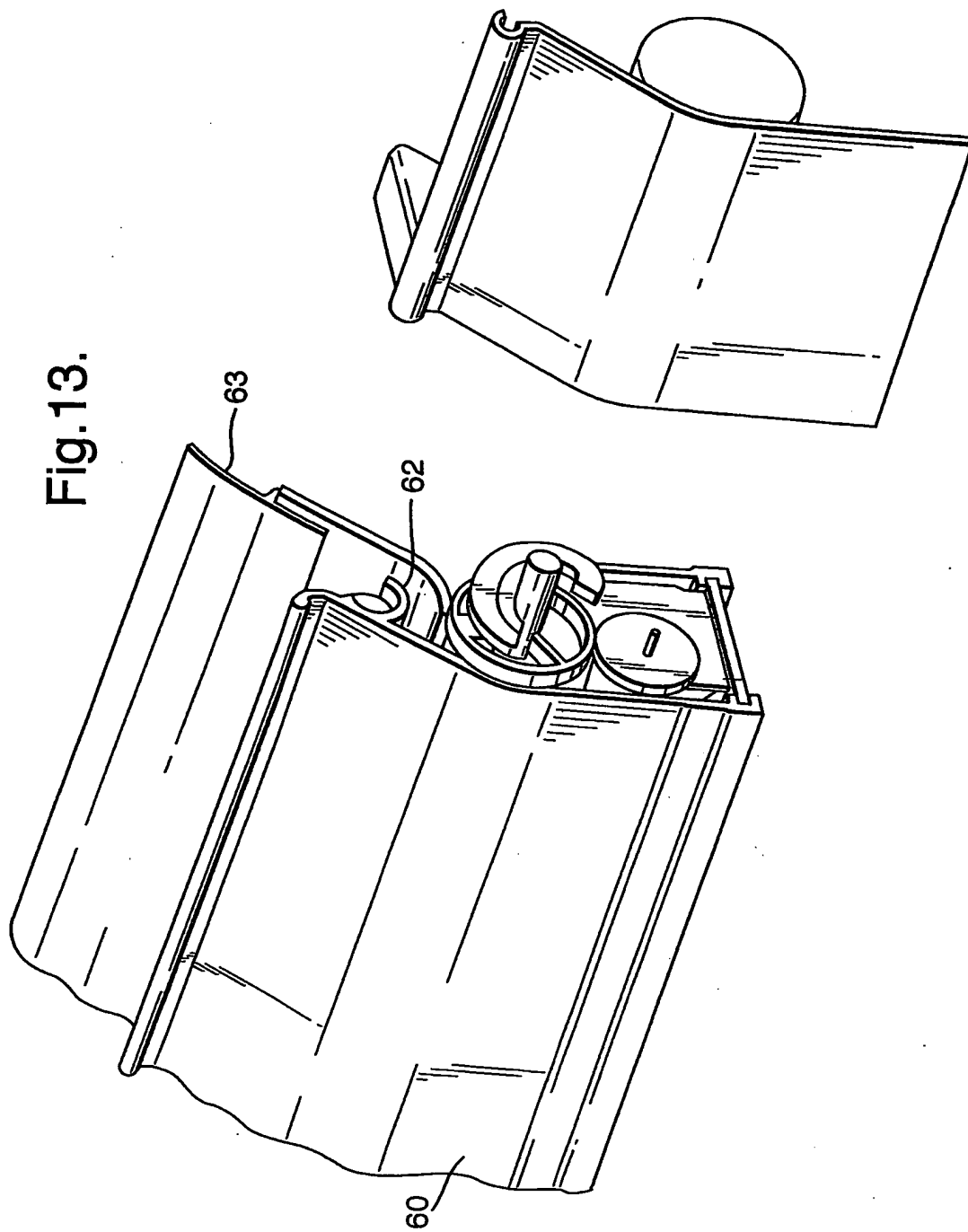
Fig.11.



7/8

Fig.12.





INTERNATIONAL SEARCH REPORT

International Application No

/GB2004/004844

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A01M1/04 A01M1/10 A01M1/12 A01M1/24 A01M1/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE WPI Section PQ, Week 199634 Derwent Publications Ltd., London, GB; Class P14, AN 1996-336457 XP002317429 -& JP 08 154556 A (MITSUBISHI JUKOGYO KK) 18 June 1996 (1996-06-18)	1,10,11, 13,17, 18,20, 21,25, 33,34, 36-38, 41,42, 44,45
Y	abstract; figures 1,2	2-9,12, 14,19, 22-24, 26-32, 35,43, 46-49
	-/-	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

11 February 2005

Date of mailing of the international search report

28/02/2005

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Moeremans, B

INTERNATIONAL SEARCH REPORT

International Application No

.../GB2004/004844

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE WPI Section PQ, Week 200423 Derwent Publications Ltd., London, GB; Class P14, AN 1997-094395 XP002317430 -& JP 08 332015 A (IKARI SHODOKU KK) 17 December 1996 (1996-12-17) abstract; figures 1,2,4,5</p>	<p>1,10,11, 13, 15-17, 21,25, 33,34, 36-41,45</p>
Y	<p>GB 23884 A A.D. 1900 (JOSEPH ADDISON FRANCIS) 26 October 1901 (1901-10-26)</p> <p>page 1; figures 1-6</p>	<p>2-9,12, 14, 22-24, 26-32, 35,46-48</p>
Y	<p>EP 0 022 592 A (SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V) 21 January 1981 (1981-01-21) page 4</p>	<p>6,49</p>
Y	<p>US 5 425 197 A (SMITH ET AL) 20 June 1995 (1995-06-20) column 2, line 22 - line 29</p>	<p>19,43</p>
A	<p>US 5 815 981 A (DOWLING ET AL) 6 October 1998 (1998-10-06) cited in the application abstract; figures 1,3</p>	<p>1,25</p>

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2004/004844

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.;
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 50, 51
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International Application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 50,51

Claims 50 and 51 rely on references to the drawings, which is not allowed according to Rule 6.2(a) PCT.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

International Application No

/GB2004/004844

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 8154556	A	18-06-1996	NONE	
JP 8332015	A	17-12-1996	JP 3510382 B2	29-03-2004
GB 190023884	A	26-10-1901	NONE	
EP 0022592	A	21-01-1981	AT 4764 T	15-10-1983
			AU 583491 B2	04-05-1989
			AU 3795585 A	13-06-1985
			AU 6038680 A	22-01-1981
			BR 8004368 A	03-02-1981
			CA 1163603 A1	13-03-1984
			DE 3065041 D1	03-11-1983
			DK 304780 A ,B,	17-01-1981
			EP 0022592 A1	21-01-1981
			ES 8105554 A1	01-09-1981
			GR 69687 A1	08-07-1982
			HK 61384 A	17-08-1984
			IN 154399 A1	27-10-1984
			JP 56018527 A	21-02-1981
			JP 64045977 U	22-03-1989
			MY 65285 A	31-12-1985
			NO 802112 A	19-01-1981
			NZ 194339 A	02-09-1983
			PT 71554 A	01-08-1980
			SG 32584 G	08-02-1985
			TR 21059 A	10-06-1983
			ZA 8004215 A	29-07-1981
US 5425197	A	20-06-1995	AU 662333 B2	31-08-1995
			AU 1789892 A	30-12-1992
			CA 2109844 A1	26-11-1992
			DE 69221298 D1	04-09-1997
			DE 69221298 T2	08-01-1998
			DK 586432 T3	09-03-1998
			EP 0586432 A1	16-03-1994
			ES 2104918 T3	16-10-1997
			FI 935206 A ,B,	23-11-1993
			WO 9220224 A1	26-11-1992
			GB 2271499 A ,B	20-04-1994
			GR 3025132 T3	27-02-1998
			JP 2731628 B2	25-03-1998
			JP 6507548 T	01-09-1994
			NO 934239 A ,B,	23-11-1993
			SG 22095 G	16-06-1995
			ZA 9203744 A	30-12-1992
US 5815981	A	06-10-1998	CA 2234755 A1	17-10-1998